HONOLULU
LA JOLLA
MONTEREY
TIBURON

SOUTHWEST FISHERIES CENTER

MONTHLY REPORT - MAY 1980
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SOUTHWEST FISHERIES CENTER
LA JOLLA, CALIFORNIA

HONOLULU LABORATORY
LA JOLLA LABORATORY
TIBURON LABORATORY
PACIFIC ENVIRONMENTAL GROUP

MONTHLY REPORT - MAY 1980

STATUS OF PUBLICATIONS

Published

Hokama, Y., L. H. Kimura, K. Shiraki, R. Shomura, R. Uchida, B. Ito, B. Takenaka, and J. Miyahara. 1980. An immunological approach for CTX. Sea Grant Quarterly 2(1):1-6. Spring 1980. University of Hawaii Sea Grant College Program.

Randall, J. E., and J. R. Chess. 1979.
A new species of garden eel (Congridae: Heterocongridae) of the genus Gorgasia from Hawaii. Pacific Science, Vol. 33(1).

(Note: Abstracts are not available since reprints, or copy of paper, have not been received.)

Approved by Center Director

Leatherwood, Stephen, Randall R. Reeves, William F. Perrin and William E. Evans. Whales, dolphins and porpoises of the eastern north Pacific and adjacent arctic waters - A guide to their identification. For consideration for publication as a NOAA Technical Report.

Gruber, D., E. H. Ahlstrom and M. M. Mullin. Distribution of ichthyoplankton in the Southern California Right. For consideration for publication in the Fishery Bulletin, U.S.

Adams, P., and W. H. Lenarz
Initial estimates of the ability to target on species and species groups in the Northeastern Pacific otter trawl fishery. For consideration for publication in the Canadian Journal of Fisheries and Aquatic Sciences.

THIS REPORT DOES NOT CONSTITUTE PUBLICATION AND IS FOR INFORMATION ONLY.

Translation

Nakamura, Kunisuke, Yutaka Fujii, and Senji Ishikawa. 1977. Experiments on the prevention of "burning" of tunas - I. An examination of causes of occurrence. Bull. Tokai Reg. Fish. Res. Lab. (90):39-43. (Engl. transl. by Wilvan G. Van Campen for the Southwest Fisheries Center Honolulu Laboratory, 1980, 8 p., Transl. No. 46; available Southwest Fish. Cent., Natl. Mar. Fish. Serv., NOAA, Honolulu, HI 96812.)

Administrative Report

Yoshida, Howard O. Country status report on United States of America (Small-scale fisheries in the U.S.A.). SWFC Admin. Rep. H-80-8.

HONOLULU LABORATORY

INSULAR RESOURCES INVESTIGATION

Plans Made for Three Research Cruises to Northwestern Hawaiian Islands

Richard N. Uchida, Leader of the Insular Ecosystem Study, held several discussions with scientists from the U.S. Fish and Wildlife Service (USFWS), the Hawaii Division of Fish and Game (HDFG), and the University of Hawaii Sea Grant (UHSG) to prepare plans for three forthcoming cruises to the Northwestern Hawaiian Islands (NWHI). Based on these discussions, final cruise instructions were completed for cruise 80-30 of the Townsend Cromwell which began on May 28. Personnel from USFWS, HDFG, UHSG, and the Honolulu Laboratory will be surveying, studying, and assessing the Hawaiian monk seals, seabirds, and nearshore marine resources of the NWHI. At the completion of Part II of the cruise, the Cromwell is scheduled to stop at Hilo, Hawaii for an Open House during July 30-31 in observance of NOAA's Tenth Anniversary. Thomas S. Hida, Fishery Biologist, and Research Assistant Bernard M. Ito will be Chief Scientists on Part I and Part II of the cruise, respectively.

In addition, Uchida completed preliminary cruise instructions for TC-80-04 and began discussions for a "piggy-back" charter in the fall, and held preliminary discussions to prepare specifications for issuing three contracts. One contract concerns a tagging study on green turtles in the NWHI; the second deals with the feasibility of permanently marking turtle hatchlings with an auto-transplantation graft of pale shell material to predetermined areas of dark, dorsal shell surface; and the third contract is for a continuation of the monitoring of kahala, Seriola dumerilii, for ciguatoxin.

Research Cruise to Northwestern Hawaiian Islands Completed

The NOAA research vessel, Townsend Cromwell, returned to Honolulu on May 14 after a two-month cruise, surveying the fishery resources in the NWHI and the seamounts near Midway and Kure Islands. In a continuation of work, surveys were conducted in the vicinity of Necker Island, French Frigate Shoals, Pearl and Hermes Reef, and the Hancock Seamounts. Considerable emphasis was also placed on surveying certain banks and seamounts north of Midway and Kure Islands.

Chief Scientist Reginald M. Gooding noted that one of the Cromwell's missions was to locate and survey a relatively isolated small bank or pinnacle that could be fished intensively for several weeks, until the catch rate was reduced by one-half. The data collected from such an experiment could be incorporated into a model intended to estimate the area's initial population size. Based on available charts, it was anticipated that several shallow areas within the Northampton Bank system would be suitable for this study. Unfortunately, it was found that shallow peaks shown in existing charts are actually part of an extensive bank that is far too great to allow the envisioned experiment.

In support of various studies on monk seals and seabirds presently being conducted by NMFS and the USFWS, the Cromwell also transported Daniel Moulton of USFWS to Laysan Island where he joined the group of NMFS and USFWS investigators who are conducting a six-month study of seals and seabirds on Laysan. The Cromwell also transported a team of five scientists, headed by Robert DeLong of the Northwest and Alaska Fisheries Center of NMFS, from Midway Island to Lisianski Island where they were to conduct a five-week study to determine the feasibility of studying monk seal movements with the aid of radio and depth monitoring tags.

Other members of the scientific field party on the Cromwell were John J. Naughton, Western Pacific Program Office, SWR, and Research Assistants Victor A. Honda, Robert L. Humphreys, Bert S. Kikkawa, Alan R. Everson, and James H. Prescott.

Assistance Provided for Training of Seagoing Observers

Research Assistant Paul M. Shiota travelled to Guam to assist Harry Kami, Chief, Aquatic and Wildlife Resources, Government of Guam, with the training of seagoing observers on the FV Typhoon, which is under charter to the Pacific Tuna Development Foundation to conduct bottom fishing trials around Guam and the Northern Mariana Islands. Shiota reported that bad weather conditions generally hampered the fishing trials.

* * * * * * * * * *

R. Uchida completed the first draft of a report on the Joint South Pacific Commission/NMFS Workshop on Marine Turtle in the tropical Pacific Islands. The workshop was held at Noumea, New Caledonia in December 1979.

Shiota completed a draft of the report, "Current trends in Hawaiian fisheries," that he is preparing with Uchida.

Research Assistant Robert B. Moffitt revised his paper on bottom fishes prepared for the NWHI Symposium. He also completed the cruise report for a commercial fishing cruise on the Easy Rider, prepared a section on the procedures for collecting, identifying, and determining the sex of shrimps for a field manual, and revised and updated the NWHI species code list.

* * * * * * * * * *

Dr. Jeffrey J. Polovina, Statistician, attended an ecosystems workshop on the Bulk Biomass Model held at the Northwest and Alaska Fisheries Center in Seattle. Polovina is planning to simplify and adapt the Bulk Biomass Model to fit the NWHI ecosystem.

* * * * * * * * * *

Research Assistant James L. Prescott completed laboratory work processing ovaries of wahoo, Acanthocybium solandri, sampled in the NWHI to determine trends in spawning activity. He also analyzed historical and current spiny lobster, Panulirus marginatus, tagging data to determine molt growth increment and intermolt periods.

FISHERY MANAGEMENT PROGRAM

Preliminary Work Started on Survey of Wholesale Fish Products in Hawaii

Gary L. Kamer, Statistician, and Research Assistant James C. Cooper are working in cooperation with the staff of Survey and Marketing Services, Inc. (SMS), in designing an enumeration form for a survey of wholesale fish products in Hawaii. The survey form has not been finalized as yet, but a test form used by SMS in a preliminary sample survey indicated that with some additional modifications, a simpler form will provide adequate information without risking resistance from fish wholesalers.

Kamer is also working on the initial stages of a proposed contract for an inventory of recreational and commercial fishing vessels in Hawaii, Guam, American Samoa, and the Northern Mariana Islands.

Skipjack Tuna Landings Continue Below Long-Term Average

The May 1980 Hawaii landings of skipjack tuna were estimated at 40 metric tons (MT), which is 430 MT below the May 1979 landings and 404 MT below the 1964-79 long-term average for May. The cumulative landings from January through May were estimated at 161 MT, which is 670 MT below the 1979 landings for the same period and 775 MT below the 1964-79 long-term average for the same period.

PELAGIC RESOURCES INVESTIGATION

Experiments Provide Evidence for an Unconditioned Response of Yellowfin Tuna to Altered Magnetic Field

The open ocean is an environment impoverished in orientational cues; however, one major cue conceivably available to migrating tunas is the geomagnetic field. Birds demonstrate the ability to use this cue but thus far no other vertebrate species have been studied. Studies have shown that bluefin tuna possess magnetic material that is dispersed through their body musculature, which is a necessary condition for a sensitive geomagnetic detector.

Michael Walker, graduate student at the University of Hawaii, and Dr. Andrew E. Dizon, Leader, Pelagic Ecosystem study, have recently found evidence that yellowfin tuna will respond without prior conditioning to an abruptly altered earth's magnetic field near the fish. As part of the studies being carried out on thermoregulation in tunas (temperature preference studies), yellowfin tuna are trained to swim through a narrow trap connecting two large wooden tanks. Upon completion of the experimental

series for temperature preference, the trained behavior of the fish--swimming through the trap for a food reward--can be exploited to study behavior in an altered magnetic field.

An electromagnetic coil was mounted on one side of the 2 ft x 4 ft passage between the tanks. A direct current power supply delivered 210 V at 1.5 A to the coil which projected a horizontal field of about 0.5 gauss into the swimming path of the fish as it swam through the trap. This field is oriented about 90° to the earth's field and thus, the direction of the resultant field was displaced about 45° from the normal and oriented obliquely to the direction the fish had to swim to pass through the trap. When the magnet was switched on, the fish had to swim through a zone of changing field direction around the entrance to the trap and across the resultant field within the trap, subjecting the fish to a series of rapid changes in field strength and direction.

A yellowfin tuna with prior training was allowed to make about 20 passes (designated the pretest passes) through the trap to determine the time normally taken between passes. At random intervals following these initial passes, the electromagnet was switched on immediately after the fish had made a pass and switched off immediately after its next pass. These were called the tested passes. Subsequent untested passes were divided into two groups: those passes immediately after a tested pass (called the pass after) and the remaining untested passes (called the untested post-test passes).

The time taken for all passes was recorded. The results of three days of testing for one yellowfin tuna are shown in Table 1.

The results show that the fish normally took about seven seconds between passes. Tested passes and the passes immediately after them took longer than the initial untested passes. These findings indicate that:

1) Initiation of testing with the altered magnetic field affected the subsequent behavior of the fish as indicated by the time between passes through the trap.

Table 1.--Effect of an altered magnetic field on the time taken by a yellowfin tuna to swim between two tanks. Mean time/pass in seconds, N = number of passes.

Date	Pretest ± s	N	Untested post-test ±	N	Tested ± s	N	Pass after ± s	N
4/29/80	7.2 ± 3.96	33	7.2 ± 1.94	15	12.4 ± 5.43	4	8.5 ± 3.0	4
4/30/80	5.8 ± 1.30	19	8.1 ± 3.26	31	8.8 ± 5.63	10	13.9 ± 8.1	10
5/5/80	6.5 ± 3.28	20	10.5 ± 5.5	25	10.8 ± 4.71	6	13.8 ± 6.3	6
Grand Mean	6.5 ± 0.67	72	8.6 ± 1.7	71	10.7 ± 1.8	20	12.1 ± 3.1	20

2) The most important effect is on the time taken to make the pass immediately after the fish has made a pass through the altered magnetic field.

This unconditioned response of yellowfin tuna to an altered magnetic field of about the same strength as the earth's field suggests that yellowfin tuna, and probably other tunas, are capable of sensing the earth's magnetic field. This response may indicate a means by which the fish are able to navigate during migration.

Behavioral Thermoregulation Experiments on Tuna Continue

Dr. A. Dizon and Martina Queenth continued the experiments designed to determine temperature preference of yellowfin tuna. The fifth fish has now been acclimated to the tank and will soon be allowed to start controlling its tank temperature. Prior training is necessary to assure that the fish is comfortable in making passes through the 1-square foot passage. This behavior is necessary to control tank temperature successfully. To date, two of the five fish have successfully regulated tank temperatures. Temperatures chosen by the fish centered around 27.0°C and were surprisingly high.

Visiting Duke University Scientists to Study Fish Swimming Dynamics at the Kewalo Research Facility

Visiting scientists Dr. Stephen Wainwright and associates, from the Zoology Department of Duke University, will be investigating locomotion in tunas during the next month at the Kewalo Research Facility. Their primary interest is in the mechanics of swimming in bony fishes, specifically focusing on the skeleton, skin, connective tissue, and muscle. Their goals are threefold: First, they will be determining the changes and rates of change of the curvature of the fish by the kinematic analysis of swimming tunas. Deformation of the skin will also be investigated. Second, they will be investigating the intervertebral joints, measuring their flexibility and the mechanisms which control the joints. This work will be done by Mary Hebrank, who will also be determining which structures transmit the force of the locomotor muscles to the tail in tunas. Finally, if time permits, they will deploy force and pressure transmitters under the skin of tunas and make measurements of their swimming movements.

Work Continues to Induce Captive Tunas to Spawn

In expectation of successfully inducing spawning in captive kawakawa (Euthynnus affinis) by June, cultures of phytoplankton and rotifers are being maintained at the Kewalo Research Facility, reported Research Assistant Thomas K. Kazama. The temperature controlled larval rearing tanks, designed by Kazama and Research Assistant Sharon D. Hendrix, have been completed and the start-up of the system is scheduled soon.

M. Queenth reported that the ova diameters of captive kawakawa have increased from an average of 0.190 mm in April to 0.290 mm in May. The largest average ova diameter was 0.491 mm from one individual.

M. Walker successfully tested his device to collect wild plankton in Kewalo Basin. Copepods and nauplii of unknown species were collected and are being maintained on a mixture of Chaefoceros sp. and Tetraselmis sp. These zooplankters will be used to feed the larval tuna.

Fishery Biologist Assigned Task of Managing the Kewalo Research Facility

Randolph K. C. Chang, Fishery Biologist, has been assigned as the Manager of the Kewalo Research Facility in the recent reorganization of the Honolulu Laboratory. A meeting of Honolulu Laboratory personnel, students, and visiting investigators using the Kewalo facility was called to discuss the reorganization. The purpose and objectives of the facility and standards of conduct and responsibility were discussed and offices, work, and storage areas were assigned.

To improve security at the facility, work has begun on upgrading and repairing the existing perimeter fence and installing a secured entry system that enables deliveries and visitors to be screened before entry. More space will be made available for research with the clearing of existing storage areas of obsolete and disposable equipment. The move of the Townsend Cromwell to the State of Hawaii facility in Honolulu Harbor has made most of these changes possible at Kewalo.

Poor Weather Stops Acoustic Tracking Work

Lt. (jg) Howard A. Jemison reported that owing to poor weather conditions and the need to haul out the Kaahele'ale for yearly maintenance, only one tracking cruise was completed during the month of May. However, no fish were caught for tracking purposes on that cruise.

Work continues on a second generation depth tag that will be 50% smaller than the existing model. In addition, a pressure chamber was completed which will allow testing and calibrating the acoustic tags at pressures equal to those at 1,000 meters.

Monitoring of Aggregation Buoys Continues

Donald C. Aasted, Fishery Gear and Equipment Specialist, reported that the survey work around the State of Hawaii aggregation buoys using the RV Kaahele'ale began on April 1, 1980. One buoy was chosen as the primary study buoy and a second was selected for comparative purposes; results thus far are not encouraging. The buoys seem to be located in water that may be too shallow, and the underwater "drape" on the buoys appears to be inadequate. Work on the monitoring project will continue.

Collaborative Study Proposal on Tuna Energetics Accepted by National Science Foundation

Dr. Andrew R. Dizon, Fishery Biologist and Leader of the Experimental Ecology of Tunas program at the Honolulu Laboratory was notified this month that a proposal on tuna energetics has been approved by the National Science Foundation (NSF) for two years of funding. The study submitted jointly to NSF by the Southwest Fisheries Center, the California Institute of Technology, University of Wisconsin, and the University of Michigan is titled "Tuna energetics and hydrodynamics: An Interdisciplinary Study of Energy Transfers." The research will be conducted at the Honolulu Laboratory which supports the only facility in the world which is devoted to the maintenance and culture of tunas for experimental studies under controlled conditions.

The unique feature of this proposal, said Dizon, is that it is a collaborative investigation by a team of academic and NOAA researchers with a multi-disciplinary background. The objective of their research is to construct an integrated regulatory mechano-physiological model for the energetics of a pelagic, high-speed fish--the tuna.

The skipjack tuna (Katsuwonus pelamis) will be the primary subject for the studies of this modeling since its many unique features (continuous swimming, varying buoyancy, warm body, and large size, to name a few) are believed to provide the widest scope of energetics research for the proposed work.

According to Dizon, efforts will be centered on the overall energetics of the tuna and will be directed toward investigating aspects of hydrodynamics, muscle efficiency, heat transfer and storage, active respiration, and other food requirements of the skipjack as they depend on swim speed, body size, and temperature.

Results of this study will be used to develop models of foraging behavior, indicate the thermal preferences of tunas, produce a global model of tuna distribution, improve current concepts of population dynamics, and lay the ground work for tuna aquaculture.

The starting date for the study, funded at $100,000, is September 1.

DATA MANAGEMENT AND TECHNICAL SERVICES

Systems Development Projects Continue

George W. T. Liao, Operations Research Analyst, continued work to implement various computer based systems for the Honolulu Laboratory. Liao met with U. S. Coast Guard officials on data communication between Hawaii and the continental U. S. on the Enforcement Management Information System (EMIS) at 2400 band and the feasibility of implementing real-time telex message switching from the Federal Building in downtown Honolulu. A communications test will be conducted during the first week of June.

Liao also reported that the agreement of understanding between the Department of Land and Natural Resources, State of Hawaii, and Southwest Fisheries Center, NMFS, to implement the Fishery Information Network (FIN) has been reviewed and cleared by State of Hawaii officials and presently awaits a signing ceremony. He has been working with Fred Kellenberger, Southwest Fisheries Center, and the Northwest Administrative Services Office in working out the many details for implementing FIN. Liao also 1) met with various Federal officials interested in using Program Learning for Automatic Teacher Operation (PLATO) as a teaching substitute for courses sponsored by the Office of Personnel Management and for in-house tutorial programs for new employees, 2) met with officials of Hawaiian Telephone Company on a design for a possible computerized branch exchange system (CBX) for the Honolulu Laboratory, and 3) continued to respond to vendor inquiries on the remote job entry station proposal. Due to various problems, the deadline for written proposals has been extended to June 9.

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Lucille T. Tsukano, Computer Aid, and Karen Wendel, Computer Aid, Young Adult Conservation Corps (YACC), completed processing data from the Guam and Micronesian Maritime Authority.

Ray F. Sumida, Fishery Biologist, Sally H. Kuba, Computer Programmer, and Wayne Ogata, Computer Aid (YACC), continued to reformat, edit, and document the data sets in the Honolulu Laboratory data bank.

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Colleen Nakato, Computer Aid (YACC), K. Wendel, and A. Everson participated in a training class in ORBIT search techniques.

LA JOLLA LABORATORY

Coastal Fisheries Resources Division

ENERGY BUDGET FOR FEMALE ANCHOVY ESTIMATED

Estimation of an energy budget for female anchovy, using laboratory experiments and data from anchovy in the sea, has been completed by Dr. J. Hunter and R. Leong, Fishery Biologists at the La Jolla Laboratory. In the laboratory, groups of anchovy grew much faster than anchovy in the sea; the growth in weight or length was about seven times that estimated for wild anchovy by Spratt (1975). Thus the average ration consumed by anchovy in the laboratory, 2241 cal/day (about 124 calories per gram fish wet weight per day) is probably much more than the one consumed in the sea. On a wet weight basis, the laboratory ration (4.5% of fish wet weight per day) is deceptively low because the pelleted laboratory food had a much lower water content (35%) than natural foods (85%). A caloric equivalent ration of natural foods (copepods) would be about 16% of the wet weight per day.

No spawning occurred in laboratory groups, hence the proportion of the daily ration incorporated into the ovaries (0.8%) was a function only of maturation and growth of the ovary. Most of the caloric gain in the laboratory was in fat; the percentage of the dry weight that contained fat increased from 32.6% to 44.2% in one group and from 24.5% to 43.2% in another, and accounted for about 9.2% of the daily ration. The caloric conversion efficiency for the total gain of calories in the body (including ovary and fat) was 12.8%. Hunter and Leong calculated from data of Takahashi and Hatanaka (1960) that the Japanese anchovy, Engraulis japonicus, fed Euphausia pacifica in the laboratory had a gross efficiency (in calories) of 11.9%, which is similar to their estimate of 12.8% of E. mordax.

Growth of anchovy in the sea from age 1 to 2 years is equivalent to a gain of 6.2 k cal, and the energy cost of 20 spawnings for a 1-year-old female is about 10 k cal (see table). Assuming that the caloric conversion efficiency for anchovy in the sea is the same as in the laboratory (12.8%), 1-year-old females (mean weight 10.3 g) consume annually about 127 k cal, of which 8% would be used for reproduction and 5% for growth. This implies a daily rate of consumption in the sea of 348 cal/day or, on a wet weight basis, about 4% body wet weight per day in copepods (copepods = 5252 cal/g dry weight, Laurence (1976); water content of Calanus - 84.7%, Lovegrove (1966)). Sirotenko and Danilevskiy (1977) estimated from stomach content analysis that the Black Sea anchovy Engraulis encrasicholus consumed 1.5 - 3.7% of their body weight per day; Mikhman and Tomanovich (1977) estimated from field captured specimens that E. encrasicholus consumed 1.4-3.0% of their body weight per day when they fed upon phytoplankton, 3.5% when they

Annual energy budget for female northern anchovy.

Age (years)	Standard length (mm)	Wet weight (g)	Annual energy budget (kilo calories)			Percent of ration	
			Growth	Reproduction (20 spawnings)	Ration	Growth	Reproduction
Begin - End	Begin - End	Begin - End					
1 - 2	93 - 112	7.33 - 13.25	6.24	10.0	127	5	8
2 - 3	112 - 126	13.25 - 19.33	6.38	21.0	214	3	10
3 - 4	126 - 136	19.33 - 24.69	5.60	34.3	312	2	11

ate zooplankton, and 9.3% when they ate benthic animals. The estimate derived by Hunter and Leong of 4-5% body weight ration per day for females of 1-3 years old is within the range of these values.

Detailed Examination of Anchovy Ovaries Required for 1980 Estimate of Spawning Biomass Completed

Dr. J. Hunter reports that as of June 11, 1980, B. Macewicz of UCSD and F. Grey, NMFS, completed all work on anchovy ovaries required for the 1980 estimate of spawning biomass, based on the egg/gonad survey technology. Work began on March 31 and required 2.3 months to complete. Additional work will continue into the summer to provide supplemental information, but the measurements required for the estimate are completed. This work included processing 34 trawl and purse seine collections of anchovy (excluding 0 trawl catches). Each collection contained 20 females (when available) and a variable number of males (the number of males required to bring the combined sample weight of males and females to 400 grams when fish were selected randomly); fish were weighed, measured, gonads weighed and a gonad sample removed and preserved for histological analysis. Total fish processed in this manner was 1,896. The ovaries of 670 females were stained, sectioned, examined histologically and the spawning state and atretic state of the ovary tabulated. The fecundity of over 30 females was estimated from counts of hydrated eggs in the ovary.

Development of Organ Systems in Pacific Mackerel Studied

During the last month, serial sections of growth series of Pacific mackerel (Scomber japonicus) were being studied in order to compile a description of the development of organ systems for the species. The information will contribute to the understanding of ecological requirements for mackerel and their capabilities at different growth stages. It will also provide background information for evaluating effects of starvation and competition with other species, such as the northern anchovy.

One mackerel organ, the gas bladder, differs from that of the anchovy and shows striking variability among laboratory-reared mackerel larvae. The gas bladder is present 18 hours after hatching and, though small, usually inflated. By the end of the first week, when larvae are about 4 mm SL and the yolk with its oil drop is virtually gone, the bladder has become a typical physoclist structure, detached from the digestive tract and containing a prominent gas gland and rete mirabile. It may be inflated, or fully deflated and contracted. Among some 50 specimens ranging up to 27 mm SL, one-third had fully or partly inflated bladders and two-thirds had fully contracted bladders. Inflated bladders appear to occupy about six times the space of contracted bladders in the body cavity.

As yet, scientists do not understand why inflation-deflation difference occurs over the size range examined. The inflated bladders occurred in larvae with empty digestive tracts, but some of the larvae with contracted bladders, including a few of the largest specimens in the series, also had empty digestive tracts. The phenomenon will be examined further, especially

in sea samples, to ascertain whether a daily inflation-deflation cycle operates in the mackerel, as Hunter found in the anchovy, and to determine the growth stage through which it operates.

COMMERCIAL AND RECREATIONAL FISHERIES RESEARCH FOR MANAGEMENT

14-year Average Larval Rockfish Population Estimate Calculated

John MacGregor, Fishery Biologist, has just finished calculating an average larval rockfish population estimate for 14 years of CalCOFI data. On the average, 48% of the larval population occurred in the area represented by the five lines 80-93; 6%, by four lines 97-107; 6% by four lines 110-120; and 3% by five lines 123-137.

Based on percentages the spawning appears to progress from north to south, but this is undoubtedly caused by the abundance of late-spawning species of the Sebastomus group (i.e. Sebastes rosaceus, S. umbrosus, etc.) off southern California.

In the area represented by lines 60 through 77, 63% of the season's spawning has taken place by the end of February; lines 80-93, 53%; lines 97-107, 38%; lines 110-120, 36%; and lines 123-137, 19%

Partyboat Passenger Study Conducted Under Contract Near Completion

On May 5, Al Zangri and Dave Dysart of the Center for Natural Areas presented a preliminary final report on the partyboat passenger survey which they conducted under contract to NMFS; the work began in 1978 and ended in September 1979. Summary statistics and a narrative description of the survey were included in a written report, while the results of a travel-cost demand analysis were presented in a preliminary fashion. From the computer file of survey responses the following tables were generated.

TABLE 1
Response By Round And Instrument

Round 1 - Summer 1978

Telephone 420 out of 529 = 79%

On-Board 529 out of 1154 = 46%

Round 2 - Winter 1978 - 1979

Telephone 1440 out of 1669 = 86%

On-Board 1669 out of 3038 = 54%

Round 3 - Summer 1979

Telephone 1585 out of 2040 = 78%

On-Board 2040 out of 5059 = 40%

TABLE 2

Trips By Region And Landing

Region 1 - Total Trips 68	Trips
Fisherman's Landing	12
Pt. Loma Sport Fishing	19
H & M Sport Fishing	8
Seaforth Sportfishing	17
Islandia Sportfishing	5
Dana Wharf Sportfishing	1
Davey's Locker	5
Art's Landing	1

Region 2 - Total Trips 94	Trips
Seal Beach Sportfishing	15
Belmont Landing	5
Ports O'Call Sportfishing	2
Redondo Sportfishing	20
Betty-O Enterprises	11
Santa Monica Sportfishing	7
Malibu Pier Landing	14
Paradise Cove Sportfishing	20

Region 3 - Total Trips 103	Trips
Port Hueneme Sportfishing	24
Channel Island Sportfishing	11
Ventura Sportfishing	18
Sea Landing	27
Port San Luis Sportfishing	13
Hittles Landing	3
Graham's Landing	6
Brebes Landing	1

Region 4 - Total Trips 102	Trips
Pillar Pt. Fishing Trips	12
Fisherman's Wharf	29
Hank Schramm's Emmeryville	14
Berkley Marina	11
Caruso's Sportfishing	36

TABLE 3

Strata Totals

	Stratum	Total Responses	
Time of week	Weekday	1833	4238
	Weekend	2405	
Time of year	Summer	2569	4238
	Winter	1669	
Type of fish sought	Surface Fish	3277	4238
	Bottom Fish	961	

To implement the travel cost model, a series of distance zones were constructed for each of the regions defined in Table 2. Demographic and economic characteristics of sportfishers in each zone were computed, along with the travel costs to various fishing sites. The model suggests that participation at any site should be negatively related to travel cost. A few preliminary regression equations presented by Zangri supported this model. Distance zones were defined as follows:

Zone	Miles from site
1	0 - 6.0
2	6.1 - 15.0
3	15.1 - 25.0
4	25.1 - 35.0
5	35.1 - 50.0
6	50.1 - 100.0
7	100.1 - 150.0
8	150.1 - 200.0
9	200.1 - 300.0
10	300.1 - 400.0
.	.
14	Over 700.0

For San Diego weekend passengers fishing in the summer, the following equation was calculated:

$$\ln Q = 3.61 - .018TC - .0006PY + 1.22\ SURF \quad R^2 = .87$$

where Q is per capita participation by zone, TC is travel cost per trip, PY is per capita income of participants in each zone, and SURF is the expected catch of surface fish (yellowtail, barracuda, bonito, mackerel, etc.) as indicated on the survey forms. This estimated relationship conforms to the theory, but more investigations concerning demand relationships are planned.

Cindy Thomson's work on more sophisticated recreational models is progressing. She is currently sorting and stratifying the data, preparing to evaluate a willingness-to-pay model and a multiple binary choice model. A specific approach to statistical estimation of binary choices -- called multinomial logit procedure -- was developed by Daniel McFadden at UC Berkeley. The program package, called QUAIL, is available both at Berkeley and UC Davis. Dr. Huppert is working with Jerry Fletcher of UC Davis, Dept. Agricultural Economics, to get a Burroughs computer version of QUAIL.

Report of Peru Workshop

A workshop at Instituto del Mar de Peru (IMARPE), entitled "Survival of Eggs and Larvae and Their Relationship to the Environment," was attended by Alec MacCall, California Fish and Game biologist detailed to the La Jolla Laboratory. Other Center participants included A. Bakun, R. Parrish, G. Theilacker and R. Owen (see related report under the submission for "Larval Fishes, Coastal Pacific" in this Monthly Report).

MacCall's report is as follows:

The workshop was organized by Dr. Gary Sharp of FAO, formerly of the Inter-American Tropical Tuna Commission and was funded by FAO and Pesca Peru, representing the Peruvian fishing industry. The participants included the IMARPE staff and a group of younger and lesser known (but certainly capable) biologists and oceanographers. Sharp's intent was iconoclastic: to introduce IMARPE to a new group of scientists, and to show that this would result in new ideas.

The workshop report to Pesca Peru and IMARPE was to be completed by May 9, but is not very detailed. The formal papers and proceedings of the meeting will probably be published as one or more FAO Fisheries Technical papers, and the deadline for final revisions is September 1, 1980.

The workshop attempted to examine the physical and biological mechanisms leading to survival of early larvae. This may be the first time a group of biologists and oceanographers have assembled for a detailed look at this subject. After a series of individual presentations covering each participant's area of knowledge, the workshop divided into several working groups.

The group of oceanographers examined the processes of formation and destruction of physically stable micro-layers. Such layers are unlikely to persist above the thermocline due to mixing in the upper layer. A hypothesis was developed whereby "fossil" density stratifications are deposited as the thermocline rises. Favorable conditions include quiet winds, strong sunshine, and perhaps cloudy nights. These stratifications are eroded when the thermocline deepens due to mixing, especially by wind events and possibly by convective overturn on clear nights. These physically stable layers (caused by micro-density structure) offer colonization sites for formation of food patches. Work is needed to define biological rates of patch formation as well as physical rates of formation and destruction of stable structures:

The biologists used Dr. William Vlymen's model of larval events leading to first feeding as a point of departure. The most difficult problem was to define the size and separation of food patches. The kind of information needed for modeling was examined and defined, and some appropriate laboratory experiments were suggested.

Peruvian fishery scientists are under pressure from both the government and the industry to make six-month forecasts of fishery performance. At the present, the fishery begins in March, after the fall spawning, as soon as the recruits become available. The recruits are six-month and one-year cohorts from the preceding spring (September) and fall of one year earlier. IMARPE is considering development of a pre-recruit survey, which could provide a two to three month forecast of recruitment strength. The possibility of recruitment forecasts based on environmental monitoring is remote. The probable low precision of such forecasts indicates that they should remain internal until they are precise enough to be used for government and industry planning.

State of Peruvian Fisheries

Anchoveta: Peru has experienced five El Niño years during the 1970's, which is unprecedented. The anchoveta resource has collapsed, and the most recent acoustic surveys indicate only about 1.5 million tons. IMARPE has recommended no fishing until the resource recovers at least to 5 million tons. There has been little fishing on their central (Callao) and Northern (Chimbote) stocks for the past few years. Their southern stock is shared with Chile, and was not heavily fished until recently; now both countries are heavily fishing this stock.

Sardine: Historically, sardines did not occur south of Ecuador. Fish scales in anaerobic sediments off Peru (covering the last 12,500 years) also show no presence of sardines. Since the decline of the anchoveta (1972) sardines have extended their range southward to northern Chile, and stomach contents show that they are eating the same foods as the anchoveta, including phytoplankton. The fishery is now taking about 2 million tons of sardines, mostly for reduction. Because the large Peruvian anchovy vessels are not equipped to preserve the fish in good condition, only the top of the load is canned.

Peruvian scientists are concerned about the intensity of the sardine fishery, which is harvesting 50% of the biomass each year. There has been much speculation concerning the dynamic relationship between sardine and anchovy in the Peru current. Some Peruvian scientists advocate continuing heavy fishing of anchoveta to help maintain the sardine stock. A more common feeling is that both resources are subject to natural fluctuations, and that fisheries are a secondary factor in determining the species composition of the ecosystem.

1980 Anchovy Biomass Estimate

Susan Picquelle, statistician, continued studying the parameters that need to be estimated for the 1980 anchovy biomass estimate. Using the anchovy trawl data set from the February 1978 Alaska cruise, she explored various statistical procedures for estimating sex ratio and spawning frequency.

A possible measure of spawning frequency is the proportion of mature females exhibiting 0-day-old post-ovulatory follicles and/or hydrated eggs, indicating that they are either about to spawn, in the act of spawning, or have spawned within 24 hours.

The results were used to develop the analytical procedures for estimating sex ratio for the 1980 biomass estimate. This year sex ratio will be in units of weight rather than numbers of fish. A simplification in the estimation of sex ratio will be achieved by constraining the total weight of males and females, from each trawl used in estimating sex ratio, to 400 grams.

Picquelle also wrote a computer program to process the 1980 trawl data set (one record per fish) and to calculate the quantities needed for the analysis (one record per trawl).

Abundance, Mortality Rate, Distribution and Dispersal of Anchovy Larvae Examined

Richard Methot, graduate student at Scripps Institution of Oceanography, and LCDR Roger Hewitt of the NOAA Corps, both of the La Jolla Laboratory, are examining the abundance, mortality rate, distribution, and dispersal of anchovy larvae during 1978 and 1979. A comparison between seasonal patterns of larval production and early larval mortality, the resultant birthdate distribution of the juveniles allows inferences to be made about any seasonal changes in anchovy survival through the larval and juvenile stages.

Age-specific abundance and dispersal statistics were obtained by fitting the weighted negative binomial model, developed and programmed by mathematician Jim Zweifel (formerly of the La Jolla Laboratory), to the adjusted larval counts in each size class for each cruise. The program was modified to include a weighting factor for avoidance of the CalCOFI Bongo net and a factor for duration based upon observed in situ growth rates.

In March and April 1978 spawning was 3 to 4 times greater than in winter or late spring, and 20 times greater than the summer spawning rate. This seasonal pattern mirrors the birthdate distribution of the juveniles produced by this spawn. There was no apparent seasonal change in survival of anchovy larvae. This result puts bounds on the sort of environmental factor which causes inter-annual variation in recruitment. If this factor affects early larvae then it must not have varied seasonally within 1978.

If subsequent years, especially those with poor recruitment, do not show seasonal changes in survival then one must propose an environmental factor which is pervasive and affects early larvae in all months equally, or a factor which affects juveniles directly and so is simultaneously applied to all month's spawn.

* * * * * * * * *

Dr. Angeles Alvariño, Fishery Biologist, completed a manuscript this month on Spadella legazpichessi, a new benthic Chaetognatha from Enewetak, Marshall Islands, and submitted it for laboratory review. She also continued her work on how the abundance and species composition of invertebrates in CalCOFI collections are related to the abundance of Trachurus symmetricus, Sardinops caerulea and Merluccius productus larvae in 1954, 1956, 1958 and 1969.

Results of Satellite Imagery are Applied to Fishery Problems

During two weeks of the March-April cruise of the David Starr Jordan, some excellent satellite infrared imagery of the west coast of the United States and Baja California was obtained by Drs. R. Lasker and M. Laurs, with the assistance of Jose Palaez, a graduate student at the Scripps Institution of Oceanography Remote Sensing Facility, adjacent to the Southwest Fisheries Center, La Jolla Laboratory.

Under a grant from the California Space Group, a State of California agency supporting satellite studies, the Coastal Division is attempting a feasibility study on the application of satellite products to fishery problems. The relationship of oceanic fronts to fish migration, and surface temperature to fish spawning and larval fish survival, is of special interest.

The March-April cruise of the Jordan provided close-spaced (every 4 n.mi.) sampling for anchovy eggs as part of the new biomass assessment technique for the anchovy population off California. The results obtained showed that for this cruise at least, anchovy spawned within very restricted surface isotherms, and the temperature distribution could be seen over a very large scale in satellite pictures (Figures 1 and 2), i.e., from San Francisco to Vizcaino Bay, Baja California. If this relationship is true, it may be feasible to allocate ship time so that colder water is not sampled as extensively and warm water is sampled more intensively. Thus, one use of thermal imagery from satellites may be tactical, i.e. to provide the best planning for cruises, with subsequent savings in ship time and fuel costs. Because it was possible to obtain sequential pictures on an almost daily basis from March 15 to April 7, the development of the Pt. Conception upwelling plume was followed, and its extent and its effect on the offshore circulation of the California Current was clearly seen. Extremely long island wakes were seen (approximately 200 n.mi.), and the protective effect of Santa Catalina Island on the inshore zone between Los Angeles and San Diego was evident. The sluggish movement south of the California Current was clearly seen, as well as the effect of a storm on April 1 which blurred thermal boundaries considerably. A paper describing these results is being written by Lasker, Laurs and Palaez.

Workshop Held in Peru on Survival of Eggs and Larvae of Pelagic Fish and Relationships with the Environment

Fishery and oceanographic scientists (from ten institutions in seven nations) assembled in Callao, Peru in May, 1980 to discuss current and possible studies bearing on physical and biological determinants of fish stock recruitment. NMFS scientists attending were G. Theilacker and R. Owen of the La Jolla Laboratory, A. Bakun and R. Parrish of PEG and J. Zweifel of the Southeast Fisheries Center, accompanied by Alec MacCall of the California Department of Fish and Game who is stationed at the La Jolla Laboratory. The workshop, sponsored by the Instituto del Mar del Peru (IMARPE) and funded by FAO of the United Nations and Pesca Peru, was led by Dr. Gary Sharp of FAO, formerly a scientist with the Inter-American Tropical Tuna Commission.

Papers presented by workshop members during the first week provided reviews of current understanding of conditions for larval survival, including endogenous and exogenous biological factors, and the behavior of the physical environment. Research conducted by the La Jolla Laboratory's Coastal Division and at the Pacific Environmental Group in Monterey, California was prominently featured.

Figure 1A. Infrared thermal imagery of the California Coast from San Francisco to Vizcaino Bay, Baja California, April 10, 1980. Cold water (light regions) intrudes into a warm water mass (dark regions). Clouds appear as feathery white objects, particularly in the lower right hand corner adjacent to the coast. Anchovy spawning was confined to coastal areas warmer than 13.5° C which was characteristic of the main bulk of the southerly moving cold water mass. The NOAA-6 satellite was monitored from the Scripps Institution of Oceanography Remote Sensing Facility.

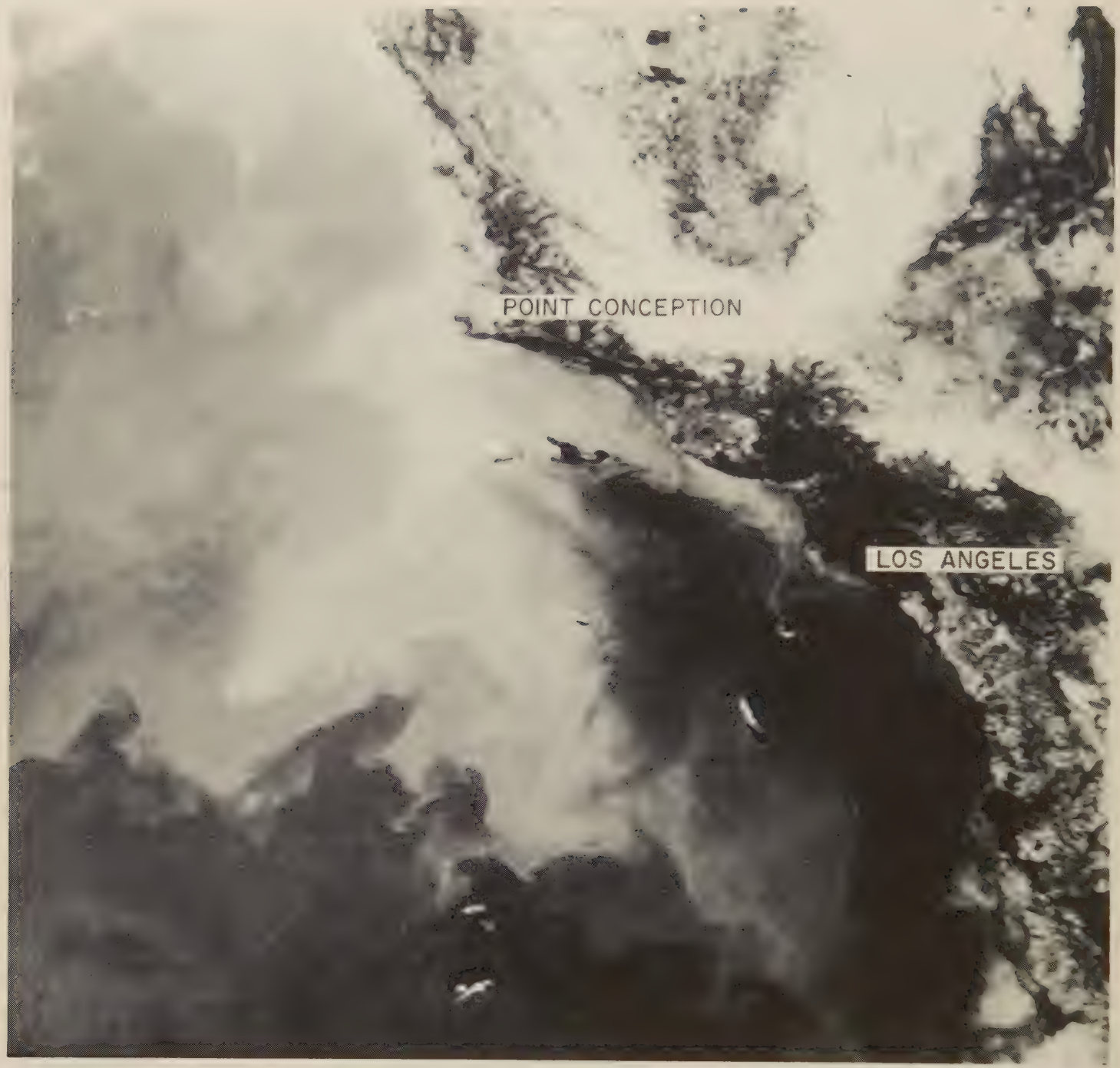

Figure 1B. Enlargement of the Southern California Bight portion of Figure 1A. Santa Catalina and San Clemente Islands are clearly seen. The large cold water intrusion was a result of the southward moving California Current entraining upwelled water from north of Pt. Conception.

Gail Theilacker completed a paper entitled "A review of pelagic larval fish behavior and physiology," which she presented at a workshop meeting on survival of eggs and larvae and their relationship with the environment. Theilacker's paper addressed some of the behavioral and physiological differences in the early life history stages of various fish species and provided tables on larval fish feeding rates, swimming speeds, metabolic rates, and growth efficiencies. For the workshop these tables provided comparative values needed to determine the food requirements of fish larvae and as input parameters in larval fish survival models.

Oceanographer R. Owen prepared a paper, "Patterning of flow and organisms in the larval anchovy environment" that surveys modes of interaction of organism behavior and flow characteristics that locally enhance organism concentration. Concentration of plankton apparently occurs by such interactions on a wide variety of conditions and scales, including the microscale (below 1 m). Such patterning can enhance larval survival by creation of sites of higher food concentrations in environments where larvae would otherwise starve.

A written report entitled "Environmental input to fishery population models for eastern boundary current regions," co-authored by A. Bakun and D. Parrish, was distributed to the participants. In addition, Parrish presented an oral paper showing seasonal and geographic correspondences of ocean transport features and fish reproductive strategies in the California Current system; these suggest important effects of transport conditions on reproductive success. Bakun presented an oral paper advocating a combination of rational and empirical approaches in fishery environmental models and summarized recent results for California Current stocks.

The report of Alec MacCall who discussed fishery status and management is covered in detail under the submission for Commercial and Recreational Fisheries Research for Management.

Major emphasis at the workshop concerned status of larval survival models based on laboratory and field studies of larval food requirements and local availability, environmental characteristics of current systems that support major resources (especially off Peru and California), physical stability and mixing and effects on food availability, and requirements for a general model of physical-biological interactions for qualitative forecasting of fish recruitment. The effort centered on early larval stages and did not address predation on larvae. A draft report of the workshop is on file in the Coastal Division at the La Jolla Laboratory.

Oceanic Fisheries Resources Division

DEVELOPMENT

Billfish/Oceanic Shark Fishery Management Plan Resumed

On May 15, 1980 the Pacific Fishery Management Council voted to continue development of the Billfish and Oceanic Shark Fishery Management Plan to the point that it could be presented for public hearing.

Jim Squire, Chairman of the Council's FMP Development Team, has prepared a revised draft for consideration by team members and later by the Council's Advisory Panel. Recent developments in the rapidly expanding drift gill net fishery for oceanic sharks and swordfish has required considerable revision of the portion of the FMP dealing with this fishery.

New Record may be Established for Numbers of Striped Marlin Tagged in 1980.

Since late February 1980, the catches of striped marlin by the recreational fleet have been far above average about the tip of Baja California, Mexico. The run of striped marlin was about 2 1/2 months early in this area and high yields have continued through May. This has resulted in a large number of marlin being tagged and released. If this trend continues through the early summer, a new record for numbers of striped marlin tagged in 1980 will be set by fishermen participating in the Cooperative Marine Game Fish Tagging Program.

North Pacific Albacore Stock Assessment Analyses to be Presented at Workshop

Fishery Biologists Earl Weber and Norm Bartoo report that the stock assessment analyses aimed at establishing the status of the North Pacific albacore stock are about half completed. The analyses include estimates of yield-per-recruit to the fishery and a compilation of fishery statistics. The results will be presented as working papers at the upcoming Fifth North Pacific Albacore Workshop to be held in July at the SWFC.

The current assessment efforts are part of continuing work begun in 1974 by scientists of the Southwest Fisheries Center and the Far Seas Fisheries Research Laboratory in Japan. The assessments were begun because of concerns for the continued well-being of the North Pacific albacore stock owing to rapidly rising catches in the early 1970's as well as changes in the stock. Lately, poor U. S. catches of albacore have generated additional interest.

Tuna Vessel Participation in FAX Advisory Program

During April 1980, 20 tuna seiners contributed synoptic weather data to the NMFS FAX advisory program. A total of 162 weather observations were reported via NMFS-licensed radio station WWD. The table below lists program participation during April 1979 and 1980.

	April	
	1979	1980
Number of vessels with equipment	47	45
Number of vessels reporting	26	20
Number of weather observations reported	222	162
Number of XBT observations reported	5	0
Total Observations	227	162

Leading all program participants this month were the captains and crews of the Carol S. and Santa Rosa. We wish to thank these and all other contributors.

Alternate Management Options for Atlantic Yellowfin Tuna Explored

Mathematician Al Coan reports that a compilation of the available data for determining the feasibility of gear-area-time closures to fishing as a possible alternate management option for Atlantic yellowfin tuna has been completed. Plots of yellowfin tuna catches in one-degree squares in the eastern tropical Atlantic were generated and tables of catches of yellowfin tuna under 55cm in length by 5x10-degree areas (finest resolution possible with current data) were calculated. Procedures for generating the plots and tables were documented. These products are being presented at the Juvenile Tuna Workshop, sponsored by the International Commission for the Conservation of Atlantic Tunas (ICCAT), held in Brest, France, May 26 to June 6.

Additional investigations by Al Coan and Economist Sam Herrick will be done to evaluate area and/or season and/or gear closures as possible management options for Atlantic yellowfin tuna. Various management alternatives will be assessed in terms of their effect on Atlantic yellowfin yield per recruit and on catches of bigeye and skipjack tuna, as well as their overall economic impact.

These investigations are responsive to a request by ICCAT to analyze alternative management actions aimed at increasing the yield-per-recruit of Atlantic yellowfin tuna. Although minimum size regulations have been in effect for Atlantic yellowfin tuna since 1973, catches of undersize fish remain relatively high, resulting in only nominal increases in yield-per-recruit.

MARINE MAMMAL BIOLOGY AND TECHNOLOGY PROGRAM

Morphological Variation Studied in the Bottlenose Dolphin

The draft final report dealing with morphological variation in the bottlenose dolphin under a contract to William Walker of the Los Angeles County Museum has been received and will be accepted after minor changes. Based on an analysis of specimens from various museums and from the tuna fishery, Walker concluded that the evidence supports the existence of at least two forms of Tursiops in the eastern Pacific, near-shore and off-shore forms. Unfortunately, the specimens of the off-shore form in California are few and Walker believes that larger sample sizes are needed before the taxonomic status can be completely defined. According to Walker's analysis, the best characteristic for separating the two forms is tooth diameter. Walker also looked at stomach contents in both forms and found that the inshore form feeds on larger prey, often demersal fishes than does the off-shore form. Dr. W. Perrin and Walker intend to continue their efforts to define the taxonomic status of forms of Tursiops and eventually to revise the genus.

Cetacean Field Guide Revised

"The Whales, Dolphins, and Porpoises of the Eastern North Pacific: A Guide to their Identification in the Water," by Stephen Leatherwood, W. E. Evans and Dale W. Rice, has been completely revised and submitted for consideration for publication as a NMFS Circular. The new edition, authored by Stephen Leatherwood, Randall Reeves, William Perrin, and William Evans contains much new narrative material and many new photographs of cetaceans. The new volume is intended for use by tuna porpoise observers employed by the Southwest Region, Northwest and Alaska Fisheries Center personnel and others. Because the Field Guide will often be used at sea, printing plans will specify water-resistant paper and waterproof binding.

Female Spotted Dolphin Successfully Tracked by Radio

A radio-tracking experiment using Hawaiian spotted dolphins was conducted this month by Fishery Biologist Jacqueline Jennings and Biological Technician Ray Stives off the Kona coast of Hawaii. The experiment was designed to obtain data on the surfacing times of spotted dolphins. Scientists need to know how long dolphins remain on the surface between dives in order to determine the appropriate antenna design for the satellite-linked radio tag.

The experimental radio pack was placed on the dorsal fin of a captured female spotted dolphin. The animal was then radio-tracked

successfully for several days. During this time scientists recorded the signals and then took motion pictures of the animal's surfacing behavior. These data are now being analyzed.

Center Cetologists Attend Meeting on Behavior and Intelligence in Cetaceans

Drs. W. Perrin and W. Stuntz, Fishery Biologists at the La Jolla Laboratory, attended a three-day meeting on cetacean behavior and intelligence in relation to management and the ethics of whaling. The meeting was sponsored by the International Whaling Commission (IWC) and was held at the Freer Gallery at the Smithsonian Institution in Washington, D.C. Most of the meeting was given over to questions of ethics, with the result that there will be a special meeting of the IWC Scientific Committee which will focus on questions of how cetacean behavior affects stock assessments and other management problems.

Participating in this unusual meeting were animal psychologists, ethologists, neurophysiologists, comparative anatomists, philosophers, psychiatrists, representatives of the Japanese whaling industry, environmentalists, fishery biologists and others. The more than 35 papers presented at the meeting will be published.

Study of Geographical Variation in Stenella Species Nears Completion

The University of Oklahoma has a contract with the Southwest Fisheries Center to investigate geographical variations in dolphins of the genus Stenella in the Pacific. M. Douglas of the University of Oklahoma visited the Center for three days in May to measure about 90 skulls of dolphins of this genus killed in the tuna fishery. In addition to measuring specimens here, Douglas has traveled to other locations in the U.S. and overseas where there are collections of Stenella skulls. He has measured more than 1000 skulls to date, and will soon begin multivariate analyses of the data to re-examine the geographical limits of population units in the eastern Pacific.

Seminar Describes Computer Simulation of Purse Seining

Supervisory Fishery Biologist James Coe presented a seminar on May 20 entitled "Current technology in porpoise mortality reduction research." As a part of the seminar, Coe showed a movie of a computer-generated display from his net simulation model. The present simulations indicate an ability to model the behavior of submerged nets. Coe is continuing work on this project.

MARINE MAMMAL ASSESSMENT AND MONITORING PROGRAM

Knowledge of Equatorial Cetacean Communities Extended on Oceanographer Survey

Dr. David Au, Fishery Biologist, reported that marine mammal observers Robert Pitman and Scott Sinclair of the Southwest Fisheries Center recorded 192 sightings of at least 17 cetacean species from the NOAA research vessel, Oceanographer. Their 20-day trip from March 22 to April 12, 1980, on the San Diego to Kwajalein leg of the ship's trans-Pacific voyage to China had been arranged to take advantage of the equatorial transit between 110° and 180°W.

Since previous studies by the Center of cetacean habitats along the equator had largely been limited to areas east of 125°W, this study substantially extended the knowledge of equatorial cetacean communities. The two marine mammal observers counted cetaceans schools at sighting rates similar to that observed in the eastern Pacific tuna fishery grounds by research vessel surveys mounted by the Center. The species composition and inter-specific relationships observed among dolphins, tuna, and birds were markedly different.

The Oceanographer was primarily engaged in physical oceanographic studies along the equator in support of NOAA's Equatorial Pacific Ocean Climate Studies (EPOCS) and was led by Dr. Ants Leetma of NOAA's Atlantic and Meteorological Laboratories (AOML). Pitman and Sinclair's observations contributed to the overall success and interest of the cruise, and future cooperative work is being planned with EPOCS projects to increase the Southwest Fisheries Center's knowledge of areal and seasonal aspects of pelagic cetaceans.

IATTC Data on Porpoise Sets Evaluated for Inclusion in Porpoise Hearing Record

A preliminary evaluation of data collected by the Inter-American Tropical Tuna Commission (IATTC) concerning the number of porpoise sets and species composition of animals taken by the international purse seine fleet prior to 1972 was completed jointly by scientists from SWFC, IATTC and Living Marine Resources. The information was embodied in a brief report made to Administrative Law Judge Hugh Dolan to be included as part of the record for the hearings held this year on proposed porpoise regulations for 1981. Further joint work with IATTC on this information is planned.

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Correction to SWFC Monthly Report, March, 1980, p. 20:
Staff personnel that contributed to the preparation of data for the hearings on proposed porpoise regulations also included N. Lo, B. Wahlen, and W. Perryman.

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A set of editing programs are being developed by Jay Walker of Potomac Research Incorporated, under contract to the General Services Administration, and Frank Ralston, Computer Specialist, which will test consistency between the several porpoise/tuna data bases. Primary targets for the programs are elements containing times, dates, positions, and species codes.

PACIFIC ENVIRONMENTAL GROUP

Fishery Attache Recalls Service in Japan

Oceanographer Jim Johnson, presently at the Pacific Environmental Group, returned to the National Marine Fisheries Service on May 1 after serving 3 1/2 years as Regional Fisheries Attache for the Far East. He has spent 35 years in four Federal Service departments - - Navy, Interior, Commerce and State, and plans to retire in June. Because duties as Fisheries Attache are not widely understood in NMFS, he has volunteered the following comments.

At one time or another, the State Department, acting on recommendations and advice from BCF and NMFS, has supported Fishery Attache positions in Tokyo, Mexico City, Copenhagen, Casablanca and Abidjan. Presently only two posts are functioning--one at Tokyo and the other at Mexico City. With one exception, positions have been occupied by professional fishery personnel who were formerly employed by BCF or NMFS. The exception is the position at Mexico City, now occupied by a well qualified career Foreign Service Officer.

The Tokyo position, established in 1958, was first filled by Wil VanCampen. Others who have occupied this position are Arnie Suomela, Clint Atkinson, Lorry Nakatsu, Keith Brouillard and Jim Johnson. Selectee Bob Iversen is now undergoing State Department clearance procedures and briefing both within State and Commerce and will probably report for duty in Tokyo about September 1, 1980.

The work of a fishery attache can be divided roughly into the following four categories: 1) political, 2) scientific, 3) economic and commercial, and 4) cultural and social. The Fishery Attache's area of concentration depends on the time and region.

During Johnson's tour in Tokyo, there were many political problems in fisheries. At the outset of his tour in October 1976, the U.S. and Japan were stil negotiating a Governing International Fishery Agreement (GIFA) which would outline precepts for Japanese fishing in the U.S. fishery zone. The U.S. delegation spent several months in difficult negotiations with Japan before agreement was finally reached, just before

the FCMA became effective on March 1, 1977. In fact, for a few hours Japan had to halt all fishing operations in the U.S. zone on March 1 until final administrative procedures were cleared as a result of the GIFA.

Soon afterwards the International Convention for the High Seas Fisheries of the North Pacific was negotiated to ensure that the Convention conform with our FCMA provisions.

The new political status of the Micronesian entities of Marshalls, Federated States of Micronesia and Palau, caused them to need assistance in fishery matters, regarding their relationship to Japanese government and industry.

Japan's government and its industry were continuously negotiating with other countries. Keeping track of these agreements, especially those which impacted on U.S. interests, was another time consuming effort.

Keeping up with scientific advances in fisheries, one of the most enjoyable tasks confronting the Attache, was limited because of time constraints. The attache's efforts were mostly concentrated in assisting visiting scientists with meeting arrangements, accommodations, etc., and in answering innumerable letters on fishery science in Japan, especially concerning the field of aquaculture.

Increasing economic and commercial issues demand more time of the Fishery Attache in Tokyo. Clearly, the potential for export of U.S. fishery products to Japan is great, and is already developed for expensive species such as salmon and crab. Exports from the U.S. to Japan increased from $96 million in 1976 to over $500 million in 1979, largely because of salmon, salmon roe and crab exports. Unfortunately, Japan is not a stable market and their salmon purchase depends to a great extent on two conditions: the results of Japanese culture operations, and the salmon agreement Japan negotiates with the Soviets. The U.S. is now trying to develop a Japanese market for our low valued species, such as pollock; but it is of equal importance to try to stabilize the salmon market.

As the U.S. businessman views the potential in the Japanese market, he increasingly turns to the Fishery Attache for assistance. One of the largest impediments facing him is his lack of understanding of the Japanese language and cultural and social customs. These customs, which appear in the business world as well as in other facets of Japanese life, mold an approach to business that is fundamentally different from the way a U.S. businessman might approach a business venture. To develop a useful relationship with his Japanese counterpart, the U.S. businessman must develop a sense of patience and understanding of Japanese business practices.

One of the most controversial issues in Tokyo is marine mammal protection. The activity of the Japanese whaling industry, the lack of porpoise conservation efforts, and U.S. and IWC initiatives to

dictate Japanese programs in these areas create a continuing source of friction between the U.S. and Japan. There appears to be little ground for compromise between our countries concerning these issues. A large part of the friction stems from social and cultural differences in our respective countries. In addition to marine mammal protection, the fishery attache is supposed to know about endangered species in general; issues he may become involved in include ivory trade from African elephants, sea-bird mortality in high seas gill netting, preservation of turtles, and others.

Work within the Embassy itself mostly consists of briefing the Ambassador and senior staff officers on fisheries issues significant in U.S.-Japan relations, and in formulating Embassy positions on these issues. Furthermore, the Attache must frequently brief the many, many visiting dignitaries who include Congressmen, Senior U.S. Government officials, State Governors, etc., about fisheries.

The attache's regional responsibilities include nations of the Far East, New Zealand, Australia and the Western Pacific Islands, which have often been neglected by attaches, except when travel to these areas prompted preparation of several country reports on fisheries of ROK and SE Asian countries.

In contrast to this meager effort of fisheries, one should look at that of the Foreign Agricultural Service. It has 98 attaches and counselors overseas and a large indigenous staff as well, and also has cooperative arrangements with U.S. industry in foreign countries such as the Poultry and Egg Institute, Soybean Association, etc. Fisheries has a long way to go in getting its act together for overseas representation.

The primary requirement for a job as Fishery Attache in Tokyo, according to Johnson, is overall knowledge of fisheries in the U.S. The Attache must keep up with activities of NMFS laboratories, Regional Councils, State and University programs (especially in the Pacific Coast area), and industrial and commercial activities. Every day, Japanese ask questions concerning some aspect (political, scientific, or commercial) of U.S. fisheries. Probably the next most important requirement is a sense of humor, often difficult to sustain while trying to serve four masters--the Ambassador, the State Department, Washington, D.C. and NMFS Headquarters.

Nevertheless, says Johnson, his detail as Fishery Attache was his most challenging and most fascinating job in 35 years of Federal service.

TIBURON LABORATORY

FISH COMMUNITIES INVESTIGATION

Meeting Scheduled to Discuss the Widow Rockfish, the Target of a Rapidly Developing Fishery

Fishing for widow rockfish, a once neglected species, has increased greatly between Fort Bragg and southern Washington during the past two years. Fishermen's catches and reports indicate that there is a large population of the species in the area. While apparently abundant, widow rockfish received little attention from biologists until recently because of low catches. However, the increased fishing activity has stimulated several studies during the past two years. Dr. William H. Lenarz, Task Leader of the Rockfish Analysis Task, has begun organizing a meeting on the species for early December. Most scientists working on widow rockfish, as well as several members of industry, have been contacted and indicate that they will participate in the meeting. Potential participants indicate that they will prepare talks on the fishery, the biology and the abundance of the species. Scientists plan to write up the results of the meeting and submit the papers to the Marine Fisheries Review.

New Insight May be Acquired on the Effects of Sedimentation

The normal changes in flora and fauna in a nearshore habitat at Santa Catalina Island, southern California (Figure 1), were monitored over all seasons of several years by Dr. Edmund S. Hobson, Leader of the Fish Communities Investigation, and Fishery Biologist Tony Chess. Using a variety of collecting devices,they identified fluctuations in the populations of many organisms, including the fishes, macroalgae, and various small organisms like amphipods and isopods. Most of the observed fluctuations were related to seasonal variations in the growth of benthic algae--the sediments remained essentially unchanged. Recently, however, nearby construction put vast quantities of material into suspension, and much of this settled on the study area. The resulting layer of fine sediment is 2-4 cm deep and now consolidated by a growth of fine red algae (Figure 2). Observations and collections of the biota, following this sedimentation, were made this month by Hobson and Chess that are comparable to those they made earlier. Because the earlier collections were intensive and included normal seasonal and longer-term changes, the most recent measurements, with additional measurements later, may provide new insight into effects of human-induced sedimentation.

Figure 1. The seafloor at the Santa Catalina study site before sedimentation.

Figure 2. The seafloor at the Santa Catalina study site after sedimentation.

Storm Damage to Hawaiian Reefs Investigated

Most of the corals on shallow-water reefs along exposed shores of Hawaii tolerate strong surge, but this is untrue of certain forms in deeper water, or along protected shores. Among the more fragile types is Porites compressus, a branching, finger-like form that in Kona covers much of the sea floor below the reach of ordinary surge--along exposed shores usually this is deeper than 12-15 m (Figure 1). These depths were exceeded by the surge of storm waves during the past winter, however, and extensive fields of this coral were devastated in many areas (Figure 2). To assess the impact of this destruction on the fishes, Dr. Edmund S. Hobson visited several of these damaged reefs while in Kona this month as part of his long-term reef-fish monitoring program.

The disturbance had leveled most of the upright branches of Porites compressus in many areas, but these constitute only an overgrowth that covers what probably is a more important part of the reef for the majority of reef inhabitants. Most animals associated with these reefs live, or shelter, in an underlying network of interstices formed by the skeletal remains of earlier coral generations, and probably much of these remains were deposited earlier by disturbances much like the most recent one. Not only is this underlying part of the reef habitat important to reef organisms, its components are ultimately cemented to the reef's base, where they add support needed for continued reef growth. Hobson believes that such destructive episodes are a part of the normal life history of these particular reefs, and in fact contribute to developing the conditions required by the organisms that live there.

FISHERIES DEVELOPMENT INVESTIGATION

Efforts Continue to Develop Commercial Fishery for Euphausiids Near Monterey Bay

The northern krill, Euphausia pacifica, a tiny planktonic shrimp abundant on both sides of the north Pacific, is the object of fisheries in Japan and Canada. Krill's primary use is related to fish food in the aquarium fish trade as well as for cultured food-fish. In Japan, euphausiids are used to enhance the color of the flesh of rainbow trout, while in Puget Sound, cultured salmon are fed euphausiids for the same reason.

Krill is also used in Japan as bait and chum for recreational as well as commercial fisheries, and as a food supplement for ornamental carp, to enhance their skin color. A small amount is used in human food products. The catch in Japan reached a record high of 41,000 tons in 1978, nearly 2.5 times the previous high catch.

Presently, the United States imports euphausiids from Japan and Canada, for use as fish food. At the Tiburon Laboratory, efforts are

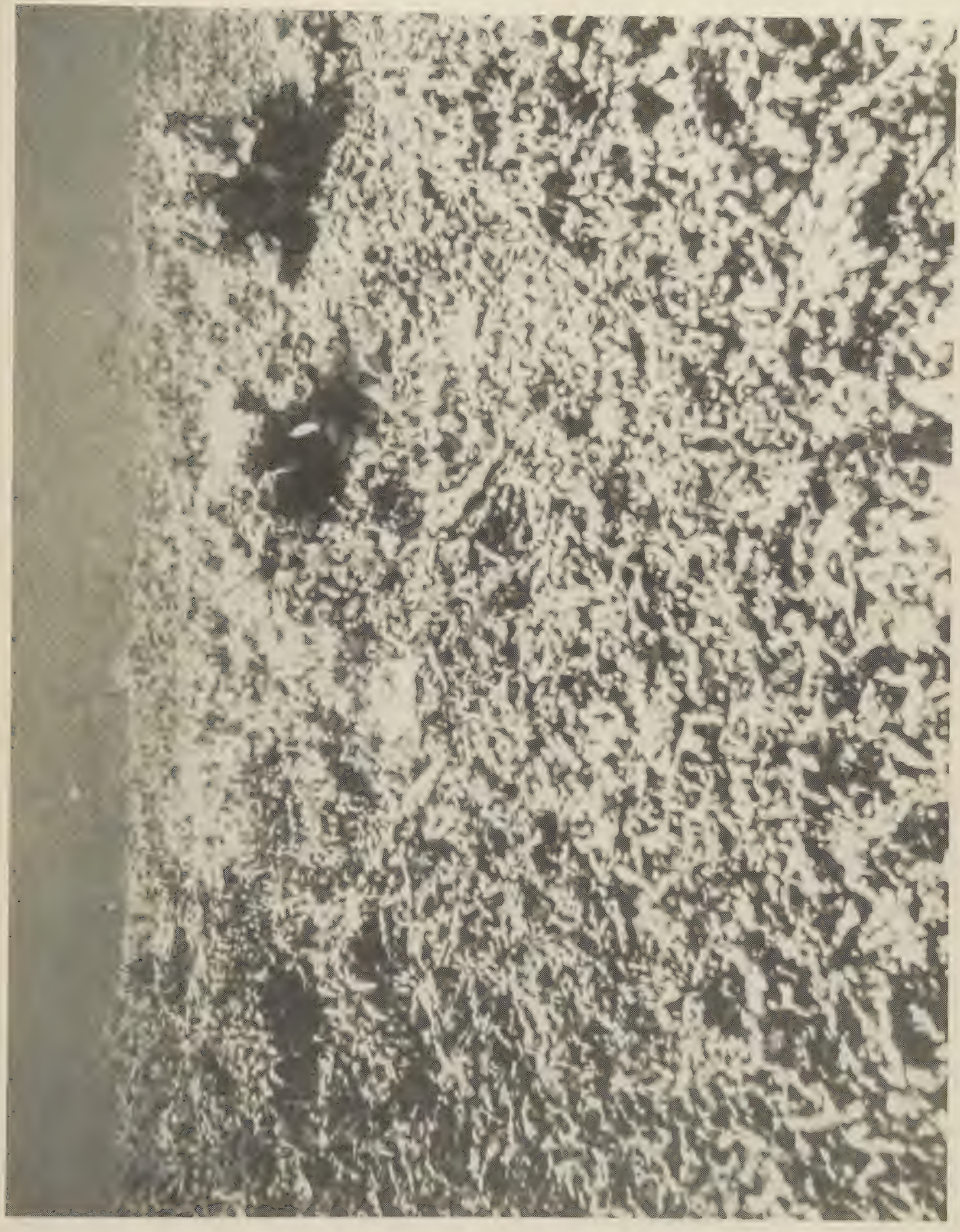


Figure 2. Reef at Kona after devastation by storm.

Figure 1. Reef at Kona before the storm.

being made to develop a fishery for euphausiids near Monterey Bay to provide a domestic supply. One buyer expects to be able to handle around 300 tons of euphausiids annually, just for the aquarium fish trade. Last month, Tiburon researchers caught a small amount of euphausiids at Monterey Bay, California, aboard a cooperating fishing vessel, San Giovanni II. Fishery Biologist Daniel Ralph reports that the bulk of the euphausiids were Thysanoessa spinifera, and only a small percentage was Euphausia pacifica. Freeze-dried samples were found acceptable by the aquarium trade, even though Thysanoessa is considerably larger than E. pacifica. Further fishing trials will be made to learn expected and incidental catch rates of small fishes and invertebrates.

Study Planned on Octopus Catch Rates in Northern California

In another fishery development project, traps for use in a study of octopus in northern California are being built by Lt. Patrick Rutten of the NOAA Corps. The objective of the study is to learn catch rates using various fishing methods. Successful methods will be used later in southern California, to learn if predation upon abalone can be alleviated by an octopus fishery. Both studies will be conducted with the aid of Sea Grant researchers and marine advisors, and commercial fishermen.

Groundfish Plan

The Groundfish Plan Development Team of the Pacific Fishery Manage- Council will meet in June to revise the draft plan as suggested by the Council. According to Co-Chairman Edward Ueber, the final draft is scheduled to be presented to the Council for approval in July, and the plan will be submitted to the Secretary of Commerce in August. Almost all finfish taken by trawlers and bottomfish hook-and-line-fishermen are included in this complex, large, and innovative management plan.

PHYSIOLOGICAL ECOLOGY INVESTIGATION

Manuscript Completed on Striped Bass Bioenergetics and Growth

The manuscript, "Bioenergetics and growth of striped bass (Morone saxatilis) embryos and larvae," was completed by Maxwell B. Eldridge, Jeannette A. Whipple, and Michael Bowers, using data from four years of laboratory experiments. The paper describes energy sources, their utilization rates and efficiencies, and the manner in which the sources meet the requirements of growth and metabolism among striped bass.

A brief summary of results show that: 1) Endogenous energy sources, which provide the sole source of energy up to the time of

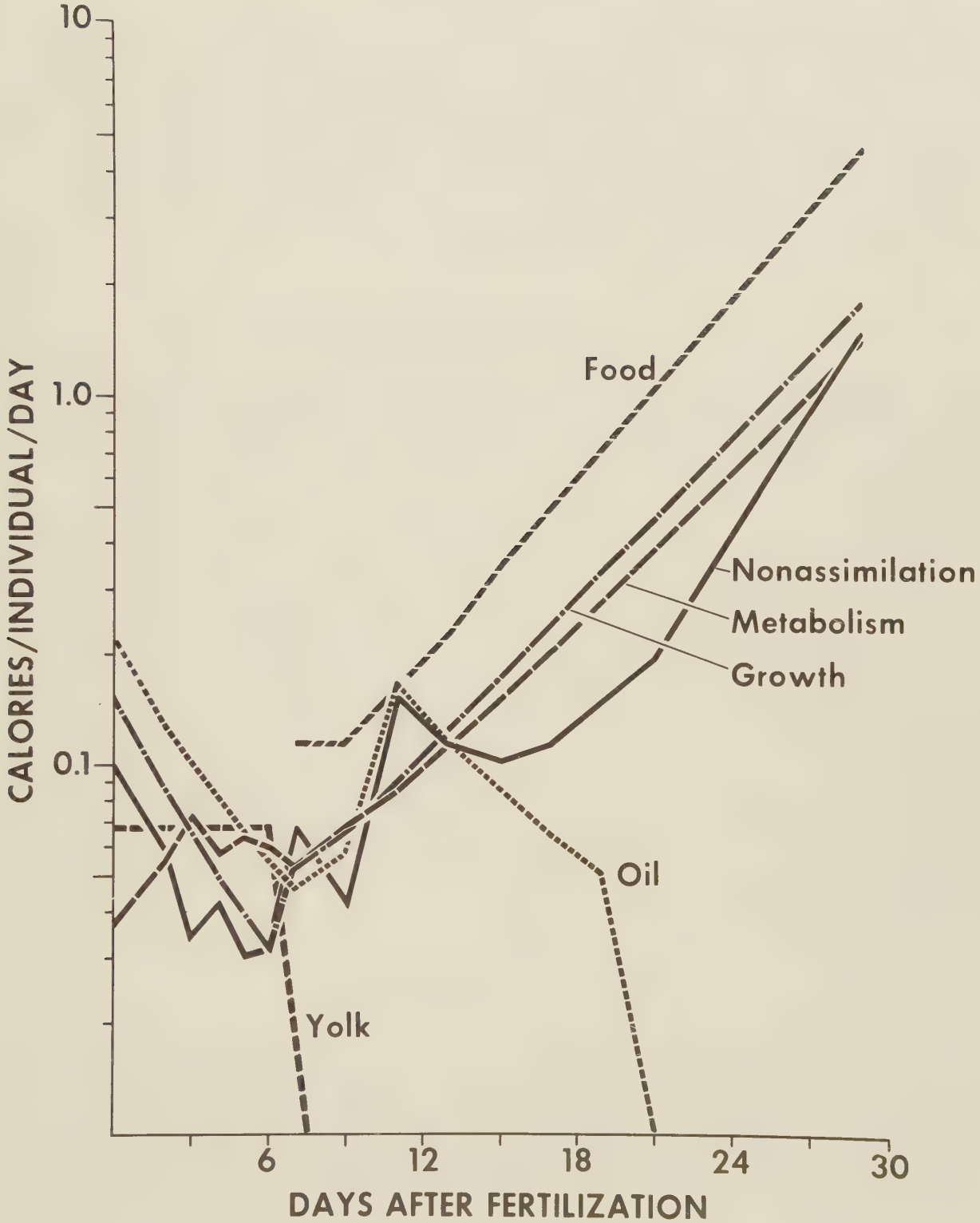
feeding, differed significantly in original amounts and this affected the early stages of growth. 2) Exogenous food, in the form of Artemia salina nauplii, was provided in six concentrations from 0.00 to 5.00 organisms ml^{-1}. The amount of food provided to the larvae correlated directly with growth and inversely with oil globule utilization. 3) Using their data on digestion and ingestion rates, the authors estimated daily caloric rations, which ranged from 0.001 to 3.940 calories per day^{-1}, depending directly on food concentration. Food rations of field-caught larvae were also calculated and found to be, for the most part, about twice that of laboratory-reared larvae. 4) Early growth directly correlated with initial egg size, but compensatory growth occurred to the effect that, 23 to 25 days after hatching, larvae were similar in size. 5) Metabolic rates measured in oxygen consumption varied with age and size. The highest rates (Q_{O_2}s) occurred in embryos and larvae prior to feeding. Metabolism of older larvae was nearly constant. Weight-specific metabolism increased with age, indicating larvae were still in the rapid rate phase of growth.

A graphic model of the energy budget for striped bass embryos and larvae feeding at the highest ration is presented in the accompanying figure (attached). The different curves represent the average daily rates of calorie inputs or outputs for an embryo and larva from fertilization to the age of 29 days. Input energy is provided by yolk, oil, and food. Yolk is totally consumed when feeding begins. Oil is used at high rates in very early development, and later during the period of adjustment to feeding. Once the larva has begun to feed, oil energy consumption declines. Energy outputs occur in growth metabolism and nonassimilation. Growth rates decline from fertilization to first feeding, then increase steadily with the extra energy input provided by food. Metabolism is slow until feeding activity begins, then it increases steadily thereafter. Nonassimilation appears to follow the oil energy input and only begins to increase after all oil energy is gone.

From this study, the authors now have a bioenergetic profile which represents some of the complex physiological responses of the early life stages of striped bass to environmental variables. Whipple and her associates now plan to describe these processes more definitively and determine how pollutants affect them.

Analyses and Autopsies Conducted on Striped Bass Collected From the Coos River, Oregon

Dr. Jeannette A. Whipple and staff have spent most of this month conducting analyses and autopsies on large samples of striped bass collected from the Coos River, Oregon. Results will be compared with those from Californian fish that may be occupying a more stressful environment.


10
1.0
0.1
CALORIES/INDIVIDUAL/DAY
Food
Nonassimilation
Metabolism
Growth
Oil
Yolk
6
12
18
24
30
DAYS AFTER FERTILIZATION

SOUTHWEST REGIONAL DATA MANAGEMENT AND ADP OPERATIONS

Financial Reporting System for Southwest Fisheries Center and Region Now Fully Operational

Computer Programmer Oden Burris reports that the problem with "Credit" entries in the Financial Reporting System (FRS) has been resolved and the correction entered to the software package. All accuracy problems with the FRS have been resolved and the system is fully operational for the Southwest Fisheries Center and Region. The FRS provides financial managers and task leaders at the Center and Region with the status of financial information on the various task plans.

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This month also Burris produced statistical data summaries of anchovy stock for defined areas from the CalCOFI Biological File for Dr. William Lenarz, Fishery Biologist at the Tiburon Laboratory. Lenarz will use this data to analyze the anchovy/pelican interaction for the Southwest Region.

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On May 29, Izadore Barrett, Center Director, and Fred Kellenberger, Data Systems Manager, attended the Pacific Marine Fisheries Commission (PMFC) Committee on Data Goals and Guidelines. The Committee is composed of members from the states of California, Oregon, Washington, Alaska, the Southwest Fisheries Center, Southwest Region, Northwest and Alaska Fisheries Center and the Northwest Region. The General Services Administration (GSA) is under contract, through the Southwest Fisheries Center, to analyze the feasibility of merging the fishery catch data that will be transmitted by the various west coast states and NMFS for fishery managers. GSA made a presentation to the committee on the different computer systems that could be utilized for a west coast fishery information system.

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A request for proposals was sent out and responses received for a contract to develop an operationally tested Center data transfer computer and to "clean up" and finalize the ship board computer in preparation for the upcoming CalCOFI year, Lt. Mark Sullivan, NOAA Corps officer assigned to the Southwest Fisheries Center's ADP group, reported. The proposals are being reviewed and the contractor will work June through October 1980.

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Final Testing of Software Package
for PACES Slated

The final testing of the software package for PACES (Pacific Cooperative Enforcement System), a cooperative enforcement information system among the Southwest Region, Southwest Center and California Fish and Game, will be conducted by Robert Butler, Computer Programmer. On May 21, Bob and Gary Galbraith of the NMFS Southwest Region conducted a question/answer session on PACES for 14 California Fish and Game enforcement aids during a training session in the Long Beach office.

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The Coastwide Data System contains vessel and landing information from the State of California, Oregon, and Washington for 1974, 1975, and 1976. This month Robert Butler extracted specific data elements from the System to create a summary file of catch statistics by vessel class for analysis by Jerry Fletcher, an economist at the University of California, Davis.

On May 22 Fred Kellenberger, Dorothy Roll, Robert Butler, Oden Burris and Rich Charter visited Computer Sciences Corporation's development office in El Segundo, California where they were given a demonstration of CSC's INFOSTATION system. This system features the concept of distributing the network mini-computer processing system.

MISCELLANEOUS

HONORS AND AWARDS

Honolulu Laboratory

Mary Lynne Godfrey, Administrative Officer of the Honolulu Laboratory, was presented a 30-year length of service pin by Director R. Shomura.

La Jolla Laboratory

Izadore Barrett, Director of the Southwest Fisheries Center, successfully defended his doctoral thesis, 'Development of a management regime for the eastern Pacific tuna fishery," at the University of Washington, Seattle, Washington, on May 28. Barrett will be granted his Ph.D. in fisheries from the University on June 11, 1980.

Tiburon Laboratory

Fish Illustration to be Exhibited at the Oaklahd Museum

Fishery Biologist Susan Smith of the Tiburon Laboratory will have one of her paintings on exhibit in the Oakland Museum this summer. The painting, a color illustration of a garibaldi (Hypsypops rubicundus), was one of those selected by the Museum's judging panel this spring. It will be shown in the Natural Sciences Gallery from May 31 through July 27, 1980, in a special exhibition entitled "California Species: Biological Art and Illustration." A public reception honoring the artists was held on May 31.

PUBLIC SERVICE

Tiburon Staffers Participate in Rescue of Man From Bay

On May 6, 1980, Tiburon Laboratory staff members Brian Jarvis, Michael J. Bowers, Dana C. Tryde, and Nancy Wiley, participated in the resuce of a man who was screaming for help while in the water under the Laboratory dock. Staff members threw him a life ring, towed him to a ladder, and assisted him from the water. He was then wrapped in blankets and taken into a laboratory to await an ambulance. The victim was suffering from hypothermia and was incoherent. It could not be determined how he came to be in the water.

SEMINARS

La Jolla Laboratory

May 6 - Dr. Philip Meyer, U.S. Fish and Wildlife Service, spoke on "Science, ignorance and the bounding of investigations into bay systems."

May 8 - Mr. Pete Macias, Special Employment Programs, NASO, Seattle, was the speaker at an EEO Seminar discussing "Management/supervisory involvement in recruitment of women and minorities."

May 8 - Dr. Rober Gentry, Northwest and Alaska Fisheries Center, National Marine Mammal Laboratory, Seattle, Washington, presented a lecture on "Comparative behavior of Alaskan fur seals: Progress report on the St. George Island harvest cessation experiment."

May 20 - Mr. James Coe, Southwest Fisheries Center, gave a talk on "Current technology in porpoise mortality reduction research."

Tiburon Laboratory

May 21-22 - The tenth and eleventh joint seminars with San Francisco State University/Tiburon Laboratory were held at the Tiburon Laboratory. The seminars were presented by Dr. Paul W. Webb, University of Michigan and NRC/NOAA Fellow at NMFS Southwest Fisheries Center, La Jolla, as follows:

May 21 - Topic: Locomotion and Predator Tactics of Fish.

May 22 - Topic: One approach to Estimating Sublethal Stress in Fish.

May 30 - Tina Echeverria presented a seminar on "Fish Morphology" to the Science students, Skyline College, San Bruno, California.

TRAINING

Honolulu Laboratory

The following Honolulu Laboratory personnel completed a 3-day course, "Personnel Management for NOAA Supervisors," presented by

Sharon Lundin, Employee Services Branch, NASO, Seattle, Washington:

Randolph K. C. Chang	Jeffrey J. Polovina
Andrew E. Dizon	Ray F. Sumida
Mary Lynne Godfrey	Lucille T. Tsukano
Bernard M. Ito	Richard N. Uchida
Sally H. Kuba	James H. Uchiyama
George W. T. Liao	Hazel S. Nishimura

S. Kuba completed a 32-hour course, "Introduction to Data Base Management Systems."

B. Ito and L. Tsukano completed a course entitled "Basic Statistics."

PUBLIC AFFAIRS

Honolulu Laboratory

Heeny S. H. Yuen, Fishery Biologist at the Honolulu Laboratory, presented a lecture and slide show presentation, "Ahi resources in the Pacific," on May 12 in Hilo, Hawaii and on May 13 in Kona, Hawaii. The presentation included a discussion on the biology, migration, and growth rates of tunas in the Pacific Ocean and also on fishing techniques, fishing pressure, and the future of the tuna fisheries. The event was sponsored by the UHSG Marine Advisory Program and the State Marine Affairs Coordinator.

La Jolla Laboratory

Fishery Biologist Jim Squire presented a talk to the Mission Bay Marlin Club on May 30, discussing the billfish resources and their distribution throughout the Pacific.

Tiburon Laboratory

May 2 - Members of the Fisheries Development Task, Tiburon Laboratory, took students of the Marine Ecology Program, San Francisco State University (under the direction of Dr. T. Niesen) aboard the Portola to collect samples of phytoplankton and zooplankton from the Racoon Straits area of the San Francisco Bay.

May 9 - Dr. Gordan L. Chan and 25 of his Fishery Biology Students, College of Marin, Kentfield, California, visited the Tiburon Laboratory. During their visit, Dr. Edmund S. Hobson talked to them about his research on coastal fish communities.

Following Hobson's talk, Mickey Eldridge gave a presentation to the students on the activities of the Physiological Ecology Investigations. After the presentation, the class was given a tour of the Laboratory facilities.

May 19 - Twenty students from the Greenbrae and Bacich Anthony Elementary Schools visited the Tiburon Laboratory. They were given a tour of the Physiology Laboratory by Librarian Maureen Woods. The students observed larvae and juvenile striped bass in fish tanks and aquaria. Dr. Jeannette A. Whipple was performing autopsies on adult striped bass which gave the students an opportunity to observe her work. Robert Hamilton demonstrated how the gas chromatograph analyzed a sample of heart tissue. The tour was concluded with a visit to the Library.

PRESS RELEASE

Honolulu Laboratory

May 28 - "Research Vessel Returns from Cruise."

VISITORS

Honolulu Laboratory

May 1
- Dr. Yoshiaki Matsuda, East West Center.
- Sherry Steffel, Washington, D.C.
- John D. Kelly (F/CM7), NMFS, Washington, D.C.

May 5
- Kevin Muench, Island Science, Papeete, Tahiti.
- Carmen Blondin (F/IA), Office of International NMFS, Washington, D.C.

12
- Norma Hughes (MB/PER52), NOAA EEO Committee, Rockville, Maryland, and Dorothy A. Brown, NOAA Corps and EEO, Washington, D.C.

15-16
- Ken Osborne (F/1A), Washington, D.C., presently on detail to USAID (DS/AGR/F).
- Kisaburo Honda, Overseas Fishery Cooperation Foundadation, Tokyo, Japan.

20 - Ramon B. Buzeta, FAO South China Sea Project, Manila, Philippines.

21 - Dr. Hideo Kawai, Kyoto University, Japan.

22 - Dr. Ziad Shehadeh, International Center for Living Aquatic Resources Management, Manila, Philippines.

29 - Mitsuo Yesaki, FAO Tuna Fishing Project, Bangkok, Thailand

La Jolla Laboratory

A distinguished visitor to the Center on May 6 was Ms. Jane Yarn, Member of the President's Council on Environmental Quality, Washington, D.C. Ms. Yarn held discussions with senior scientists and was given a briefing by Center Director Barrett on the problem of porpoise/tuna interaction.

Mrs. Yarn and Dr. Barrett at the Center

May 6 - Roland Kinney, National Academy of Sciences, Washington, D.C., met with senior staff regarding the Resident Research Associateship Program.

8 - Carroll McCutcheon, Chief of Personnel, NASO, Seattle, Washington.

12 - Howard Fraley and Aaron Bobo, NASO Personnel

14 - George Beuschold, NMFS, Fx54, and A. M. Vrooman, NMFS, F/SR2, Washington, D.C.

15-16 - Jack Wise, FX54, Washington, D.C. at the Center to evaluate the Marine Recreational Fisheries program

22 - Barbara Keith Rothschild, NMFS International Fisheries Division, Washington, D.C. Ms. Rothschild was in San Diego to attend the advisor's meeting on the Eastern Pacific Tuna Convention.

23 - Donald Fraser, Department of Geography, Concordia University, Montreal, Canada

- Director Barrett, J. Carr and D. Mackett met with Floyd Anders, Mike Fraser, and Gary Smith of the Southwest Region at the Southwest Fisheries Center to work on Regional long-term plans.

27 - Alan N. Baker, National Museum of New Zealand, Wellington, New Zealand

28 - Dr. Andrew Heron, Fisheries Department, CSIRO, Cronulla, Australia

Pacific Environmental Group

May 15 - Kevin Bailey, Oregon State University, Corvallis, Oregon

Tiburon Laboratory

May 1 - Jose Duenas, Port of Oakland, Oakland, CA
- Pete Wong, Port of Oakland, Oakland, CA

9 - Dr. Gordan L. Chan, College of Marin, Kentfield, CA

19 - George Beuschold, Office of Policy and Planning, NMFS, Washington, D.C.

- Kenneth R. Fite, Science Applications, Inc., La Jolla, CA

- John P. Wise, Office of Policy and Planning, NMFS, Washington, D.C.

20 - Alice Straus, College of Marin, Kentfield, CA

- Bruce Wyatt, University of California, Berkeley, CA

21 - James Joseph, Inter-American Tropical Tuna Commission, La Jolla, CA

- Paul W. Webb, University of Michigan and NRC/NOAA Fellow at Southwest Fisheries Center, La Jolla, CA

22 - Jean Jacobs, California Academy of Sciences, San Francisco, CA

- Joseph Spicciani, San Leandro, CA

29 - Dennis J. Fitzpatrick, University of California, Santa Cruz, CA

- Dawn Parks, University of California, Santa, Cruz, CA

MEETINGS AND TRAVEL

Honolulu Laboratory

May 3-8 - R. Shomura, Drs. Michael F. Adams and Jerry A. Wetherall, Howard O. Yoshida, and H. Yuen met to discuss the billfish fishery management plan.

7 - R. Shomura met with Skip Naftel to discuss details on placing an observer from the Honolulu Laboratory on the maiden fishing voyage of the RV Easy Rider Too.

- R. Uchida and H. Yoshida attended a meeting of the spiny lobster plan development team.

9 - R. Shomura convened a general staff meeting at the Kewalo Research Facility to present length of service pins and to discuss the Honolulu Laboratory reorganization.

9 - R. Shomura met with R. Uchida, Drs. Adams, Dizon, and Wetherall, G. Liao, and R. Sumida to discuss the Honolulu Laboratory's data processing activities.

11-17 - Fletcher V. Riggs, Fishery Biologist, and J. Uchiyama travelled to California to attend the Thirty-first Tuna Conference at Lake Arrowhead. They also visited the La Jolla Laboratory. Uchiyama also visited Alex Wild, IATTC, to discuss otolith reading techniques.

12 - Dr. John Bardach, East West Center, and Dr. Salvatore Comitini, University of Hawaii Economics Department, met with R. Shomura to discuss their tentative proposal for a workshop, "Tuna Fishery Arrangements in Southeast Asia and the South Pacific for the 1980's: International Cooperation (Bilateral and/or Multilateral Arrangements), Summer 1981."

- R. Shomura attended a luncheon meeting at the Kahala Hilton Hotel sponsored jointly by the Pacific Islands Studies Program, University of Hawaii at Manoa, the Pacific and Asian Affairs Council, and the Hawaii International Services Agency. William Bodde, Jr., Director, Office of Pacific Islands affairs, U.S. Department of State, spoke on "The South Pacific: U.S. Policy in the 1980's" at the luncheon.

14 - R. Shomura attended a meeting of the Sea Grant Advisory Council in the Honolulu Laboratory Conference Room.

15 - R. Shomura attended a meeting called by Dr. Richard W. Grigg to discuss the Northwestern Hawaiian Islands research program. Also present at the meeting were Dr. Jack Davidson, UHSG, Kenji Ego, HDFG, and Dale Coggeshall, USFWS.

16 - Cdr. John D. Stachelhaus, Commanding Officer, RV Townsend Cromwell, met with R. Shomura to discuss possible Townsend Cromwell open houses on the neighbor islands. An open house is scheduled in Hilo on July 31; open houses on Maui, Kauai, and at Snug Harbor in Honolulu will be scheduled some time in October between cruises of the Townsend Cromwell.

18 - R. Shomura departed Honolulu for Japan to attend the 19th session of the Indo-Pacific Fishery Commission (IPFC) and the IPFC small-scale fisheries symposium in Kyoto and to visit scientists at the University of Hokkaido to discuss squid research. He is scheduled to return to Honolulu on June 3. Tamio Otsu served as Acting Laboratory Director during Shomura's absence.

27-29 - R. Uchida attended the Western Pacific Regional Fishery Management Council meeting and the State-Federal Planning Strategy meeting in Kauai. The latter meeting was concerned with establishing general guidelines to coordinate State-Federal activities concerning living marine resources.

La Jolla Laboratory

May 2-9 - EEO Counselor Elaine Sandknop traveled to Boulder, Colorado to participate in a NOAA EEO Counselor Training Seminar.

5 - Dr. Barrett attended a presentation on the results of a contract on partyboat angler's expenditures and demand for partyboat angling. As Chairman, he convened a meeting of the San Diego Underwater Park Advisory Committee in San Diego.

5 - Dr. R. Lasker participated in a meeting on Marine Ecosystem Research in the Antarctic at the Scripps Institution of Oceanography.

7 - Dr. G. Sakagawa traveled to Terminal Island for a meeting on the marine mammal stock assessment document.

8-9 - Sakagawa attended a meeting with Scripps with representatives from Living Marine Resources, Inter-American Tropical Tuna Commission and the Marine Mammal Commission to review the document that will be presented to the Administrative Law Judge Hugh Dolan on May 19.

11-14 - Attending the Annual Tuna Conference at Lake Arrowhead were Dr. I. Barrett, John Carr, Dr. G. Sakagawa, and the staff of the tuna/billfish program.

12-14 - David Mackett, Center Program and Planning Officer, traveled to Portland, Oregon to attend a meeting on State/Federal matters.

14-15 - Jim Squire was in Portland, Oregon at the Pacific Marine Fisheries Commission meeting regarding the extension of Billfish and Oceanic Shark Fishery Management.

16-21 - Dr. Lasker traveled to Narragansett, Rhode Island, to discuss plankton sampling with personnel of the Narragansett Laboratory.

20-22 - Dr. P. Webb, NOAA Research Associate, was at the Tiburon Laboratory to present two seminars pertinent to local research and for discussions with the scientific staff.

22 - Attending the National Oceanic Satellite System Conference (NOSS) at Sumner Auditorium at Scripps Institution of Oceanography for discussion of NOAA's space program and NOSS' technology and development were: Dr. Barrett, Dr. Lasker, Dr. Laurs, and R. Lynn, K. Bliss, and B. Stevens.

22 - Dr. Sakagawa attended an advisor's meeting to discuss a new Eastern Pacific Tuna Convention in San Diego.

27-29 - Data Systems Manager F. Kellenberger was in Portland, Oregon to attend a data management meeting at the Pacific Marine Fisheries Commission (PMFC).

29 - Dr. Barrett attended a data management meeting at the Pacific Marine Fisheries Commission in Portland, Oregon.

30 - Jim Squire in Costa Mesa and Newport to discuss the 1980 tagging program for swordfish.

Pacific Environmental Group

May 29 - Dr. Douglas McLain traveled to Menlo Park, CA to confer with Dave Thomas, California Department of Fish and Game, who is co-authoring a manuscript with him.

Tiburon Laboratory

May 5 - Edward Ueber traveled to the Southwest Fisheries Center, La Jolla, to attend the meeting on a sportfish sampling report prepared by Alfred Zangri.

12-15 - Dr. Edmund S. Hobson, Tony Chess, and Pete Adams travelled to Santa Catalina Island, California, to monitor study sites.

13-15 - Norman J. Abramson travelled to Portland, Oregon, to attend the Pacific Fishery Management Council Meeting. At this meeting, it was decided by the Council that, after a few modifications, the Shrimp Plan will be ready for public review. Public hearings will be held at Newport, Washington; Coos Bay, Oregon; and Eureka, California, on July 30, 31, and August 1, 1980, respectively.

13-15 - Edward Ueber presented the Groundfish Plan to the Pacific Fishery Management Council at the meeting held in Portland, Oregon. The Plan was tentatively approved.

19 - Norman J. Abramson, Dr. Edmund S. Hobson, Dr. William H. Lenarz, Mickey Eldridge, and Roger Green met with John P. Wise and George Beuschold, Office of Policy and Planning (Fx5) at the Tiburon Laboratory to discuss/review the Tiburon Laboratory's Recreational Fisheries Program.

19 - Edward Ueber travelled to Portland, Oregon, to attend the ad hoc Gear Committee Meeting of the Pacific Fishery Management Council.

19 - Norman J. Abramson and Dr. William H. Lenarz met at the Tiburon Laboratory with Kenneth R. Fite, Data Manager, Environmental and Life Sciences, Science Applications, Inc., La Jolla, California. Science Applications has a contract with the California Department of Fish and Game,

funded by NMFS, to evaluate information requirements for fisheries management along the California coast. Areas of primary concern include port sampling, cost effectiveness, data flow, and data processing.

20-26 - Tina Echeverria and Dana Tryde participated in a cruise aboard a vessel chartered by the California Department of Fish and Game for the purpose of tagging rockfish and collecting specimens off Monterey, California.

28-29 - Sus Kato and Patrick Rutten travelled to Point Arena and Fort Bragg, California, to arrange octopus fishing schedules with cooperating fishermen. They also met with two members of the fishing industry who are interested in starting a sea urchin processing plant in the area.

PERSONNEL

Honolulu Laboratory

May 2 - Linda C. Hubbell, Biological Aid (Fisheries) - Resignation

4 - Dennis L. Kees, Biological Aid (Fisheries) - Temporary Appointment

9 - Steven H. Kramer, Biological Aid (Fisheries) - Temporary Appointment.

- Francine E. McMurtry, Computer Technician - Temporary Appointment.

- Anjanette S. Perry, Biological Technician (Wildlife) - Temporary Appointment.

16 - Suzanne A. Ellard, Time and Leave Clerk (Typing) - Resignation

8 - Cheryl S. Koshiro, Computer Aid - Temporary Appointment.

- Thomas T. Shigeta, Computer Aid - Temporary Appointment.

27 - James E. Kennedy, Computer Aid - Temporary Appointment.

La Jolla Laboratory

4 - Caroline Hastings, Biological Aid, EOD

4 - Steve Baumle, Biological Aid, EOD

4 - Barbara Watkins, Purchasing Agent, Redescription

4 - Barbara Engstrand, Program Support Assistant, Promotion

9 - Michael Mason, Biological Aid, Temporary Intermittent

9 - Gary Hunt, Biological Aid, Temporary, Intermittent

9 - Virginia Cass, Biological Aid, Temporary, Intermittent

9 - Michele Winkler, Biological Aid, Temporary, Intermittent

9 - Colleen Kenney, Biological Aid, Temporary, Intermittent

18 - Kenneth Wallace, Computer Specialist, Promotion

18 - Gordon Phillips, Economist, Entered on duty

Tiburon Laboratory

5 - Daniel F. Howard, Biological Aid, Temporary Appointment

- John Berge, Biological Aid, Temporary Appointment.

9 - Roslyn Muller, Biological Aid, Temporary Appointment

24 - Rachel Fisher, Data Clerk, Expiration of Appointment

6 - James R. Chess, Fishery Biologist, Notification of Promotion Effective March 23, 1980

UNITED STATES
DEPARTMENT OF COMMERCE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
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